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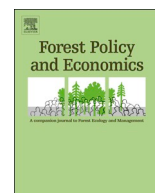
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Development and equity: A gendered inquiry in a swidden landscape

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ABSTRACT

Market-driven development is transforming swidden landscapes and having different impacts along intersections of gender, age and class. In Kapuas Hulu, West Kalimantan, Indonesia, Dayak communities practicing swidden agriculture are making choices on maintaining traditional land use systems, and engaging in rubber, oil palm and conservation (REDD +) in their livelihood strategies. Although REDD + has been heralded as an alternative to oil palm as a sustainable development option, it is still far from full implementation. Meanwhile, oil palm has become a reality, with large scale plantations that offer job opportunities and produce new sources of prestige, but create contestations around traditional land use systems. We employ the gender asset agriculture project (GAAP) framework and apply an intersectional lens to highlight power relations underlying gendered differences in land, labor and social capital in this process of transformation. Our findings suggest that market interventions produce major changes for men and women, young and old, land cultivators and wage earners. This has created new opportunities for some and new risks for others, with those having power to access diverse types of knowledge, ranging from inheritance rights to market information and job opportunities, best able to exploit such opportunities.

1. Introduction

Often criticized as a backward and unproductive land use (Fox et al., 2009; Mertz et al., 2009a; Padoch et al., 2007), swidden continues to be practiced by millions of people in Southeast Asia (Mertz et al., 2009b). Studies have shown that swidden is often a rational economic and environmental choice for farmers in the humid tropical uplands (Fox et al., 2009; Ickowitz, 2006). In this paper, we define swidden following Mertz et al. (2009a, p.261) as a “land use system employs a natural or improved fallow phase, which is longer than the cultivation phase of annual crops, sufficiently long to be dominated by woody vegetation, and cleared by means of fire.” Van Vliet et al. (2012) described swidden as a system in use when it is opportune and dropped when favorable options for land and labour use as well as income appear. Meanwhile, multiple factors such as prohibitive legislation on swidden, commercial logging, land reform, large-scale land and agricultural development, exclusionary conservation zoning, and resettlement are driving change of swidden towards new land use systems with social and ecological consequences that are still not fully understood (Mertz et al., 2009a;

Padoch et al., 2007).

Swidden and fallow areas are often mixed with trees and other market crops (Padoch et al., 2007), but the more recent transition of swidden into permanent fields for cash crops such as rubber, maize or oil palm is considered by some as opening livelihood opportunities and improving household economies. These new, mostly less diverse land use systems come with unpredictable ecological and social consequences that are only now being studied at more length (Bruun et al., 2018; Dressler et al., 2017). Changes in land use have implications on the cultural and governance practices in swidden, and can impact differentially on traditional farming roles of men and women. Indeed, changes in off-farm labour or new crops have the potential to transform or perpetuate existing gender inequalities and relations depending on the different ways of inclusion in new economic systems (Haug, 2017). Research in West (Julia and White, 2012; Li, 2015) and East Kalimantan (Elmhirst et al., 2017) suggests that the expansion of oil palm onto swidden and smallholder lands have a highly gendered impact. Corporate and state oil-palm ventures have contributed to social constructions of gender relations and have introduced changing patterns of

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land rights, division of labour, livelihoods, and voice in community affairs that have largely excluded women. However, it has also produced gendered resistance and participation in political protest to some of these developments in an effort to defend their identity and rights (Morgan, 2017). Elmhirst et al. (2017) and Li (2015) emphasized that the gendered and generational impacts of oil palm can differ highly according to other aspects like age, ethnicity, the availability of land and capital, as well as between smallholdings and plantation schemes.

Currently, there are discussions to include swidden in climate mitigation efforts such as the global mechanism reducing emissions from deforestation and forest degradation, REDD+ (Hett et al., 2012; Fox et al., 2009). Much like the development of commercial crops driven by large-scale estates or contract farming, REDD+ is an external intervention on land use that can produce gendered outcomes and trade-offs. Numerous studies documented potential risks of REDD+ to women, such as exclusion from participating in, and accessing REDD+ benefits due to changes in forest access, land and fallow use, and use rights or rules in REDD+ implementation (Larson et al., 2016; Pham and Brockhaus, 2015; Tickamyer et al., 2014; Khadka et al., 2014). Westholm and Arora-Jonsson (2015) suggest that REDD+, as with any new economic or development intervention, risks perpetuating gendered divisions of labour, as formal environmental decision-making moves upwards; and responsibility and the burden of actual environmental labour shifts further down in particularly gendered ways. The issue of gender, however, is not only about women. Indeed, discussing gender requires a more nuanced understanding of power relations, across multiple levels of governance, as reflected in structures and processes affecting local livelihood assets and strategies, and the distribution of roles, costs, benefits, and tradeoffs.

This paper examines the experiences of men and women who are practicing swidden farming and adapting to transitions towards market-driven economic development. The findings can have relevance for new forms of forest and land-based interventions such as REDD+, originally envisioned as a market-based approach to conservation. Specifically, this paper will look at gender implications of a new market-based intervention (i.e. oil palm), in comparison to a market crop that is long adapted within swidden fallows (rubber) and the traditional land use practice (swidden) in West Kalimantan, Indonesia. Our research questions are: (1) How do these market-driven systems in swidden settings affect men and women differently; (2) What are the gendered factors that constrain or enhance sustainable livelihood opportunities in the different economic development transitions; (3) What are potential gendered trade-offs within and across these pathways; and (4) What can we learn for climate mitigation efforts such as REDD+ as a potential new transition with its gendered co-benefits (and burdens) as well as for safeguards.

2. Theoretical framework

One tool to understand and assess livelihood outcomes in rural contexts is the Sustainable Livelihoods Framework (SLF), which provides a holistic and integrated view of the structures and processes, and strategies, by which people achieve (or fail to achieve) sustainable livelihoods (Scoones, 1998). Assets (also referred to as livelihood resources), although only one part of the framework, holds an important role to achieve sustainable livelihood outcomes. One of the early critiques of the SLF was that it did not address gender relations. Not all individuals within a household have equal decision-making power over or benefit equally from household assets and income (Hunt and Kasynathan, 2001; Goetz and Sen Gupta, 1994; Deere and León, 2003; Deere and Doss, 2006; Cleaver, 2000). In fact, gender studies suggest that assets are usually distributed unequally between men and women, even within the same household. This difference is known as the “gender asset gap” (Deere and León, 2003). Gender inequities, however, cannot be reduced to questions of household decision-making or resource distribution, but are part of gender relations within the

community, landscape and the wider institutional and policy environment.

While there is a vast amount of frameworks available that bring gender into the SLF, particularly in the context of local development projects (examples include the Harvard Gender Analysis Framework, the Social Relations Framework, and the Gender Analysis Matrix¹), we refer to Meinzen-Dick et al. (2011) who developed a gender asset agriculture project framework (GAAP) to understand how (larger) agricultural development interventions impact the gendered distribution of assets. In the context of our study, rubber as well as oil palm development trajectories, can be considered as agricultural interventions in swidden landscapes. Of the six asset categories the framework originally suggested, we focus in our research in West Kalimantan, Indonesia, on the tangible assets of land and labour, which are the main determinants in the swidden livelihood system. In addition, we also explore the intangible assets of social capital, which implies the capability to access and use land and labour, under the unique cultural context of the swidden Dayak community. Our analysis is novel: we move beyond the often limited development frame of understanding gender asset gaps within the dichotomy of men and women, and apply an intersectional lens to understand the underlying power relations in, and trade-offs as a consequence of, the gendered gaps (Westholm and Arora-Jonsson, 2018; Djoudi et al., 2016; Kabeer, 2015; Djoudi and Brockhaus, 2011).

Djoudi et al. (2016) in their analysis of forests and climate change, pointed out that ‘Intersectionality is based on the assumption that social categories (i.e., race/ethnicity, gender, class, sexuality, and ability) are constructed and dynamic’ (p.1). Power is central across the different dimensions and can be understood as the capacity or ability to direct or influence the behavior of others or the course of events. Kabeer (2015) understands power as the agency of people in defining their own life choices, goals and people are striving for these even in contested spaces.

In the section below, we discuss in detail assets that we focus on in this paper.

Land. Access to land resources is context dependent, influenced by structures of tenure and rights, social norms, traditions, and cultures across regions. In the past, individual ownership of customary land of the *Dayak Iban* was acquired through clearance of virgin forest (called *merimba*) (Cramb, 1989; Otsuka et al., 2000), typically the role of men. Traditionally, this claim to land can be inherited by the pioneer's descendants both men and women (Appell, 2001). However, individuals lose their rights if they move or when lands become individually owned through government promoted tree planting (ibid). Traditionally, tree planting conveys individual ownership of land (Appell, 2001; Cramb, 1989; Peluso, 2005). In this study, we observed and gathered information on land ownership, tenure arrangement, inheritance, who makes decision over land use and transfer of land tenure from public to private regime.

Labour. Labour is a gender-differentiated resource in the different roles of men and women within a farming household, and in their ability to mobilize, exchange, recruit or engage in wage labour (Hill and Vigneri, 2014; Morrison et al., 2007). Labour availability may change over time through demographic change and participation in other livelihood opportunities. For instance, male migration to cities may reduce labour availability for swidden, leaving women in the households having to mobilize external labour (Wadley, 1997). Most of the labour input needed for swidden is derived from collective labour exchange with distinct gendered roles, arranged by the head of longhouse (Patterson and Chiswick, 1981; Sather, 1993). In our study, we observed and gathered information on changes in household labour for swidden to engage with other livelihood activities.

¹ Refer to the link below for an introduction to, and comparison of gender frameworks: http://www.bridge.ids.ac.uk/sites/bridge.ids.ac.uk/files/docs_gem/index_implementation/pf_coretext.htm

Social capital. Social capital as defined by Putnam (1995) features networks, norms and social trust that facilitate coordination and co-operation. Access to social capital is particularly important for women as it connects them with formal and informal networks and groups to access valuable information, influence, and access to other resources that they might otherwise be excluded from (Quisumbing et al., 2014). Literature on gender and social networks suggest that women's participation might be constrained by lack of time due to demands in household and reproductive activities, especially when formal networks require membership fees and certain level of education (Hill and Vigneri, p. 318; Quisumbing and Pandolfelli, 2010). Networks are an important part of our study and we ask questions on how market/development projects changed the traditional networks embedded in the community and what the gendered implications are. We also explored if there are any new social networks emerging through market/development projects, how men and women access these new networks and their implications for swidden and other livelihood opportunities.

3. Site description

The still largely forested district of Kapuas Hulu in West Kalimantan, Indonesia provides an example of swidden in transition towards more intensive farming schemes. Since 2010, the district has been a REDD+ pilot site with numerous project activities led by environmental NGOs and development partners (e.g. with GIZ forest and climate program/GIZ-FORCLIME, World Wildlife Fund, Fauna and Flora International) (Eilenberg, 2015; Kallio et al., 2016).

Most of the indigenous people practice swidden as part of a diverse livelihood portfolio that has always included engagement with the wider cash economy. In 2005, the national agenda to accelerate and expand Indonesian economic development (MP3EI) introduced oil palm plantations in Kapuas Hulu (Eilenberg, 2014; Geiger, 2008) and promoted commercial tree planting (such as high yield rubber) especially on degraded land (Daeli et al., 2016).

4. Livelihood and economic activities

Agriculture remains the largest economic sector providing 72% of employment (Bappeda, 2013 cited in Leonald and Rowland, 2016) with mostly swidden agriculture, although rapidly being overtaken by industrial crop plantations.

About 5% of the population, primarily men, are engaged in migratory labour (*bejalai*). Historically, this was a rite of passage for young Dayak males, but nowadays it is to earn cash (Leonald and Rowland, 2016). *Bejalai* was typically done when male labour for swidden agriculture was not in high demand (Shantiko et al., 2013; Wadley, 1997).

Rubber was introduced to Kapuas Hulu in the early 1900s by Dutch missionaries, and over time has been integrated in the swidden system as a cash crop, accounting for between 30 and 80% of household income (Rp12.9 million/HH/year on average) when prices were exceptionally high in 2011–2012 (Shantiko et al., 2013). Income from rubber depends on the availability of other sources of income as some farmers only tap rubber when they need cash, while others tap extensively for a living.

In recent years, oil palm plantations have expanded across West Kalimantan, including in Kapuas Hulu (Shantiko, 2013). In areas near the oil palm development, most of the available local labour was hired for maintenance, harvest, and development of infrastructure e.g. road, barracks, mills.

5. Traditional land use

Traditionally, farmers manage the forest and fallow landscape for swidden farming, cultivating mainly rice but also commercial crops such as rubber, fruit trees, *Shorea spp* (*tengkawang*, nuts), usually in a mixed garden structure near the longhouse (also described in Cramb

et al., 2009). The swidden is managed in fallows of various stages (ranging from active swidden/*umai*, last year swidden/*jerame*, bush fallow, young fallow/*pengerang muda* and mature fallow/*pengerang tua*) and creates mosaic landscapes that can incorporate high levels of biodiversity and high carbon value (Bruun et al., 2013; Rerkasem et al., 2009). In addition, patches of forests are retained for burial grounds or as a border with the neighboring swidden.

The active swidden is typically an open agricultural land used to plant upland rice (*padi ladang*) intercropped with vegetables (i.e. legumes, cassava, corn). Where there is access to swampy land, people also grow *padi payak* (wet rice cultivation). Traditionally, swidden shifts every year with a rotation cycle of 15–20 years (also found in De Jong, 2001). Fallowing allows replenishment of soil nutrients through regrowth and reduces weeds invasion after slashing. Increased population pressure, conversion of swidden fallows into other land uses (settlement, permanent crops), and loss of household labour for off-farm wages have contributed to changes in the swidden cycle. In the study sites, swidden has become more intensive with increasing use of agricultural inputs, which enabled re-cultivation in the same plot for several years before shifting to a new location.

6. Methods

A mix of qualitative and quantitative data was collected from focus group discussions (FGDs) and semi-structured household surveys collected in two periods of March–April 2013 and September–November in 2013 in four villages (see Table 1 for more details on the site characteristics). We conducted 12 gender and age disaggregated FGDs (men, women and mixed gender youth groups) in the four villages involving 140 participants of relatively equal representation in gender and age: 74 males (including 28 youth) and 66 females (including 15 youth). The men and women FGDs generally involved participants aged 25 years and above. The mixed gender youth FGDs were participants aged below 25 years and unmarried. During the FGDs, the participants identified changes that they perceived as affecting community wellbeing, development projects and main current changes in their lives related to land-use, income sources, migration, and other livelihood aspects.

Respondents for the household survey were randomly selected (at least 30% of households in a village or for villages with fewer than 40 households, all households were interviewed). Both men and women were interviewed.

We collected data on land-use and swidden practices, socio-economic characteristics of the household, household migration patterns, and access to information and resources related to the customary land arrangement and agricultural interventions. During the interviews, we also collected perceptions on community engagement with rubber and oil palm, the role of agricultural extension, access to agricultural inputs, and access to livelihood opportunities.

7. Results and discussion

7.1. Development and change in Kapuas Hulu

The swidden communities of Kapuas Hulu experienced many changes. The proximity to the Malaysian border especially enabled encounters with opportunities and links to the global market. Historically, local communities have always adapted to opportunities by incorporating cash crops into their swidden, adopting new crops when the previous ones failed. Yet, thus far, swidden has remained as a safety net, as a tradition and as part of the people's identity.

Development of the 265 km 'Northern Road' linking the district capital in Putussibau to the Malaysian border in 1990–1995 brought significant changes to the local lives (Kendawang et al., 2005). It facilitated mobility and migration across the Malaysian border and other growing cities in the region (Men FGD sites 1, 2 and 4, 2013), but also brought land-based investment (e.g. timber and logging industry,

Table 1
Characteristics of the four study sites.

Characteristic	Site 1	Site 2	Site 3	Site 4
Location	Bordering Malaysia in north and north east	Very close to Malaysia border (less than 2.5 km)	Border with Betung Kerihun National Park (1-hour drive from sub-district capital)	Located in between the two national parks, 1 hour away from district capital on motorcycle
Livelihood	Mix of subsistence swidden, oil palm wage work, and rubber production	Mix of subsistence swidden, oil palm wage work, and rubber production	Majority of women involve in rubber production oil palm. Majority of men are still migrating to Malaysia, young women are working as seasonal workers at the oil palm. Majority practicing uphill swidden system located within the boundary of Betung Kerihun National Parks. Located on the upstream of Labian-Leboyan tributary	Subsistence swidden, majority of the men are still migrating to Malaysia, few are working at the oil palm plantations, and mostly are engaging with rubber production
National park	Bordering, south part borders with peat areas of Danau Sentarum wet land	Bordering, southern and south eastern of the area is located close to Danau Sentarum wet land area	Majority practicing uphill swidden system located within the boundary of Betung Kerihun National Parks. Located on the upstream of Labian-Leboyan tributary	Village is bordering with Betung Kerihun National Park
Oil palm status	Large scale clearing of peatland forest and old fallows for oil palm plantation establishment	Large scale clearing of peat land forest for expanding oil palm plantations on the northern and north western part of the village	No oil palm development near the longhouse Oil palm establishment nearby their second location near the sub-district capital, which is part of a multi-locality strategy to ensure i.e. access to schooling, administration	No oil palm development

rubber and currently oil palm). Men considered road access important enough to initiate communal work to create access paths connecting longhouse sites with the main road (Men FGD sites 1 and 3, 2013). Women, however, were more concerned, with people moving out of the longhouse to individual houses closer to the road, making it difficult to organize communal ceremonies (e.g. death, marriage) and labour exchange (sites 3 and 4).

From 1997 to 2004 in sites 1, 2, and 3, logging industry brought employment, triggered small businesses (e.g. lodgings, coffee shops and brought non-monetary benefits (such as road development, water piping and/or longhouse reconstruction) (Women FGD site 1, Men FGD site 3; 2013). Not all sites, however, accepted logging. Lack of transparency related to compensation and benefits, caused the community in site 4 to strongly refuse, even sabotaging the company by hijacking logging machinery (Men and Youth FGD, 2013).

In 2002, the national government banned logging. Although logging continued for some years, community members in sites 1, 2, and 3 (which were part of the logging boom) lost this source of cash and engaged more in out-migration. Traditional *bejalai* was resurrected, now more as a strategy to cope with economic shocks than a rite of passage. However, during the same period, the Malaysian government issued new policies on migrant workers and tightened security measures, making it difficult to access earning opportunities across the border.

In 2008, the local economy slowly improved as rubber prices increased (from IDR 5.000 in 2006/7 to IDR 20.000/kg around 1.5 USD in 2011). New species including high yield rubber seedlings, *gaharu* (*A. malaccense*), stinky beans (*Parkia speciosa*) were introduced the National Degraded Land Rehabilitation program (GERHAN), and companies started establishing oil palm near the border of Kapuas Hulu and Malaysia. During the FGDs in 2013, almost everybody in site 1 welcomed oil palm as the companies offered income-earning opportunities and other benefits such as the development of plantation roads to mill, longhouse improvement, and school buses for children. In site 3, the opening of oil palm plantations nearby the extended longhouse settlement provided opportunities for young women in the oil palm nursery as temporary workers. Despite there being no oil palm plantation in site 4, some men and women migrated to work as oil palm wage labourers in the more than 100 km distant sites 1 and 2 (FGD youth and women site 4, 2013).

These different livelihood opportunities, however, also means that less land and labour is available for swidden. From our field observations, swidden practices adapted by becoming more intensive, with a shortened fallow and changed rotation pattern. Clearing old fallow (above 10 years) became less common despite the known potential of enriched soil quality. It was increasingly common to cultivate new swidden in young fallows (2–5 years), on the last year plot or use the same plot for 4–5 years consecutively, before shifting to new locations (FGD sites 1,2,3 and 4, 2013).

The study also found declining swidden size with an average size of less than two hectares/household (HH). A longitudinal study conducted by Wadley over the span of 21 years (1979–2000) showed that this is a longer-term trend in the region. In his study, he found that swidden size shrank from the average of 4.03 ha (in 1979–1985) to 1.84 (1993–2000), and a decline in swidden rotation from 21.4 years (in 1979–1985) to 14.5 years (in 1993–2000) (Wadley, 1997, 2007).

Introduction of high yield rubber to be planted in monocrops and the expansion of oil palm has accelerated this change. More and more land was taken from the traditional swidden practice (HH Interview, 2013). Most of these lands were old fallow located further from the longhouse.

7.2. Gendered implication of development and changes

In this section, we move to an assessment of the changing gender roles using three main assets of the GAAP framework, e.g. labour, land

and social capital. We present a discussion of each factor using an intersectional lens, as none of these three factors is independent. Indeed, the same gendered power relations act and reinforce each other, resulting in a spiraling process of change.

7.2.1. Land: competing access and rights

The conversion of land use to industrial crop plantation not only decreases land available for swidden but also often leads to changes from the communal property into an individually controlled land. The registration of formal smallholder plots as a prerequisite of state-corporate oil palm programs not only reshaped communal land and labour relations, but it has eroded women's rights to land as it is often men who are the household head and owners of these plots (Julia and White, 2012; Semedi and Bakker, 2014). This has implications for inter-generational rights to land. In the Dayak communities of the study sites, swidden fallows are inherited, apportioned and managed communally by descendants of the household, which first cleared the land for subsistence food production (*tanah kongsi*). Fallow land is open for all heirs to access for swidden in a loose rotation according to his or her needs. The planting of trees (such as rubber) within swidden fallows transferred rights from communal to private ownership, consequently excluding other co-heirs and withdrawing the land from the inherited swidden pool (Li, 2002, 2014). Thus, the desire to engage in market-based development is accompanied by loss of access to land for swidden.

This loss has been an increasing concern among customary leaders at site 4, “Although it is considered taboo to plant trees on swidden land, it is difficult to stop the rapid conversion of swidden to rubber garden. (Many) still thought land for swidden is plentiful, in fact, land for swidden in our village is getting even smaller.” The establishment of national parks followed by the prohibition to open forest for new swidden and the growing population added even more pressure to land (Men FGD site 4, 2013).

Although the inheritance system does not recognize gender differences, the conversion to plantations has gender implication (Women FGD site 4, 2013; HH Survey 2013). Heirs with more knowledge on their inheritances (usually the older generation) were the first to convert swidden into rubber or oil palm, thereby excluding co-heirs, usually women and elderly widows with weaker claims.

Women whose husbands come from outside the village often have weaker positions (Men and Women FGD site 4, 2013). Our study found cases where husbands converted land inherited by their wives without their consent, particularly in the case of oil palm development (HH Survey 2013). Women often have no information on the size of land their husband have given up or the amount of money their husbands received. Women also lack access to knowledge on the terms of contract between their husbands and oil palm plantation and whether the land will be returned.

In analysing market-driven land use changes from an intersectionality perspective, access to knowledge over land, inheritance rules, rights and markets appear to be the most crucial source of power, with knowledge imbalances facilitating a restructuring of land ownership. Intergenerational knowledge asymmetries play out in favor of older male heirs, while market knowledge with the introduction of cash crops and high yield plants provides another intersection, which seems to put women of all age groups at disadvantage.

7.2.2. Competing access to labour

“Swidden remains important, even though we are working at oil palm establishment. We cannot abandon swiddening. Swidden is part of our identity of being Dayak and of our culture and traditional ceremonies.” (Men FGD site 2, 2013).

“Swidden is the basis of our livelihood: it is the source of food and hence life, whereas cash we obtain from rubber and oil palm. Swidden is also the foundation of our social life as we work together and engage with each other. Swidden also preserves the inheritance from our ancestors (in terms of padi

pun (local rice) seeds).” (Women FGD site 1; 2013).

“Without swidden, there will be no Gawai²” (Women FGD site 2; 2013).

The quotes above highlight that while both men and women in our case study highly value swidden, the two groups prioritized different aspects of swidden. While the men largely talked about the importance of swidden for Dayak culture and identity, women talked at length about the food and livelihood aspects of swidden, the social structures, and importance of inheritance systems formed around swidden. As men largely work off-farm for cash income, the responsibility of maintaining the Dayak culture and social structures around swidden fall largely on the shoulders of the women.

Expansion of oil palm has brought opportunities for wage employment, which is especially attractive to younger people. The loss of labour for swidden has led to adaptations such as shorter fallows and smaller plots. This is made possible because the cash earned in oil palm is partly used to buy agricultural and technological inputs. About 80% of all respondents mentioned the use of herbicides or fertilizers or a combination of both for swiddening. The study also showed an equally high use of chainsaws for land clearance despite only about half of the respondents owned chainsaws, mostly acquired during earlier labour migration in Malaysia. This suggests that the traditional practice of labour exchange in swidden is now complemented with renting or exchanging labour with chainsaws from neighbors.

In fact, herbicides and chainsaws were introduced long before oil palm plantations were established in 2006. Use of agricultural inputs had already freed men's labour for clearing forest, allowing them to engage more with off-farm wage work. With oil palm, men switched to oil palm wage work without changing their labour contribution for swidden. On the other hand, agricultural inputs have enabled women to perform men's tasks in swidden especially if the same plot can be cultivated for several consecutive years. For instance, women FGD participants in site 1 and 2 reported that spraying herbicides to eliminate weeds for land clearing has made their work easier and less laborious than using machetes. “If land clearing is done manually, it is very time-consuming taking at least a month to finish. If we apply herbicides it is very easy and fast” (Women FGD Site 2, 2013).

However, shortened fallow leads to heavier weed infestation during the growing phase (Fujita and Phengsopha, 2008; Roder, 1997). Because it is not possible to use herbicides on the ripened paddy field, women and elderly members of the households have to weed by hand. This might partially explain why there is no significant correlation between herbicide use and time spent on weeding as the application of herbicide cannot be a direct substitute for weeding (Nielsen et al., 2006). Table 2 outlines how a gendered distribution of labour is related to use of agricultural input and change in fallow length.

Women have a greater flexibility to divide their labour between swidden, other activities and rubber production. Typically, women rise before dawn, tap rubber and let the latex flow into the plastic container ready for collection the next day. Before 10 A.M., they are already working on their swidden until past midday before breaking for lunch (Women FGD sites 1 and 2; 2013). When women's labour is in peak demand for swiddening, they can temporarily stop tapping rubber without compromising its quality. The flexibility of management and decision over their workdays reflect certain freedoms that may not be evident in other parts of social life, particularly in contracted labour relations.

In relation to oil palm wage work, women often have to choose between swidden and oil palm work or compromise with other responsibilities (Women FGD site 1 and 2, 2013). Sometimes, women choose oil palm over swidden. For example, in site 2, several women decided not to open swidden for two consecutive years to work fulltime

² Gawai is a harvest festival, and is traditionally the most important Dayak social and religious event in the calendar.

Table 2
Gendered distribution of labour related to use of agricultural input and change in fallow length.

	Traditional gendered distribution of labour for swidden agriculture (Elmhirst et al., 2016; Mulyoutami et al., 2009; Colfer et al., 2015)	Current gendered distribution of labour with the use of agricultural inputs and changes in fallow length
Men	<ul style="list-style-type: none"> ● Land clearing (including tree felling, clearing) ● Burning ● Dibbling/sowing ● Carrying harvest ● Building field huts 	<ul style="list-style-type: none"> ● Agricultural inputs and repeat cultivation reduced labour for tree clearing. “Just spray (with herbicides), let it dry for a day, and we burn on the next day”. With the use of chainsaw, tree clearance becomes even faster (Men FGD sites 3 and 4, 2013) ● Shorter distance to fields, more efficient in transporting harvest and extra time available to engage with migration or off-farm works. “We want to plant nearby the road. It is easier to load (harvest) on the back of our motorcycle or a pickup truck. (HH Survey Site 4 # 8; 2013). In the past, we had to walk for an hour or more, while carrying 5–60 kg of rice on our back (HH Survey Site 4 #9; 2013). One respondent explained he discussed with the other family members to select swidden locations that are close to each other and close to road (HH Survey Site 4 #3, 2013) ● When swidden is more permanent, there is no need for men's labour to build field huts. “This task is very time and labour consuming. It requires investing time collecting wood and other material. We can't afford to build it every year and just to move again (Men FGD site 4, 2013)”
Women	<ul style="list-style-type: none"> ● Weeding (manual) ● Sowing ● Maintenance (manual weeding) ● Harvest (ngetam) ● Drying ● Threshing ● Storing harvested products 	<ul style="list-style-type: none"> ● Easier weeding with use of herbicides, but not necessarily lower intensity of work. “Weeding (Old fallow) was not very demanding. When working on swidden cleared from smaller trees in younger fallow, weeds rapidly invest the land. The weeding should be done at least twice after planting and before harvest (HH survey site 3 11, 2013)” ● Shorter distance means reduced time and labour needed for women to travel back and forth for weeding and extra times to engage with other chores or other livelihood opportunities ● Felling smaller trees using a machete, when men's labour becomes unavailable for land clearings. “When my husband is away for work, I am in charge for my own swidden. If you visit my field this year, it does not look like one. The bushes are so high, so difficult to combat unless I apply herbicides (HH survey site 3 # 08; 2013)”

at oil palm plantation for cash. More often, however, women opted to work only during off times from the swidden cycle, and as a result, were often hired only as casual labour without binding contracts (Women FGD sites 1 and 2, 2013 also found by Bissonnette, 2013 and Li, 2015). Under such arrangements, women are not entitled to promotion and other benefits available to permanent workers (e.g. overtime bonus, health insurance, rice subsidies loans) and do not have job security as the company can let them go anytime without having to provide severance payments (also found by Li, 2015; Clerc, 2012; Julia and White, 2012). Women were also more often assigned to maintenance tasks (e.g. spraying herbicides and pesticides, carrying and applying fertilizers, weeding) which exposed them to adverse health effects (Bissonnette, 2013). The information gathered on the gendered distribution of work and burdens in swidden as a result of the emergence of oil palm and rubber corroborates findings from other studies in this field (Elmhirst et al., 2016; Li, 2015; Colfer et al., 2015; Colfer et al., 1999).

Men, on the other hand, will choose to work for oil palm full time especially since it promises bonuses for extra work. During the men FGD in site 2, most respondents explained that oil palm provided more secure income compared to swidden, where yields are unpredictable. Some more educated young people working as permanent employees of oil palm plantations pointed out that their work schedule from 8 A.M. to 5 P.M, Monday to Saturday does not motivate them for much labour contribution to the fallow management either.

In this intersection of paid labor and gender, power relations are playing out between hierarchies of employer and employees, male and female in white and blue collar jobs, with more or less social and economic benefits and prestige, and related trade-offs that affect the vulnerability of the community, household or individual. Market driven land use change changed opportunity structures and called for, often, individual decisions over time. Time spent for different types of wage labor, the diverse activities in swidden, or in rubber production all have strong gendered implications for social status, independence, and the ability to participate in a cash economy. None of these are linear. Freedom in terms of flexibility to decide own time management might be lost in a formal employment situation, but ‘new’ freedom in consumption and the prestige that might come with it may overpower the pride that comes with the often female role of maintaining tradition.

Prestige also plays out in the intersection of hierarchies within employment structures. Here, trade-offs are related to changing social structures. The educated youth in white collar jobs might benefit from these changing power relations in general, but, young women are often working in less visible (and less visibly powerful) administrative offices, while young men execute their newly gained power highly visible in supervisory functions. While the informants did not discuss these differences and the possible outcomes of more or less visible power in depth, one can speculate if this introduces new power imbalances between men and women.

7.2.3. Social capital

Traditionally, the longhouse unites its inhabitants and facilitates exchanges of information and resources through various customary and life-cycle ceremonies or swidden activities. As most information and resources about longhouse matters are shared in the ‘ruai’ (terrace) or common space, men and women have relatively equal access. Men through their *bejalai* have gained access to a wider network of information and resources exchange compared to women, whose mobility is often limited, bounded by the longhouse and swidden. As people started to earn more cash, they tend to build individual houses and move out of the longhouse. Consequently, the roles of longhouse as locus of social capital eroded.

The labour exchange network (*Beduruk*) is a form of communal banking of labour for swiddening. When such system is disrupted, as happens when men are fully occupied in oil palm, women lose out as they are forced to compensate for the shortage of labour. The priority given to work at oil palm plantations over swidden benefits largely only the men.

On the other side, connectivity facilitated by improved road access allowed new networks. Itinerant traders visit the longhouse and thereby allow women to participate in rubber trading without having to travel to market. The caveat of such transaction is the irregularity of the traders' visits, and the lack of access by women to rubber price information. The lack of information makes it difficult for women to bargain for higher prices (FGD sites 3 and 4, 2013). The availability of motorcycles facilitates greater outreach to traders located in district market. However, women often have to rely on husbands, sons or

daughters to drive them to market. Such reliance may incur additional costs, as women have to provide meals, cigarette and fuel.

In site 2, which is located close to a market, women gain direct access to information from different traders. Women self-organized in informal networks that connect households from their neighborhood. Through this system, women take turns to collect information from traders, collectively bargain for higher price and logistics/transportation arrangement (Women FGD site 2, 2013).

Applying an intersectionality lens, it appears that mobility, as well as the structure of the production system in which people are involved provide the opportunities for building (and losing) social capital, networks and new information-based power that comes with it. Women with limited mobility and exposed to a production system such as oil palm which often takes place at industrial scale, might not be able to establish new social networks that enable benefits from the system, while existing ones linked to swidden are eroding.

8. From an understanding of gendered gaps to lessons for REDD +

8.1. Gendered gaps

Has the development of rubber and oil palm affected the gendered gap in access and rights to land? In the traditional swidden system, everyone within a lineage, regardless of gender, inherits an equal access to land as long as it is used for communal practice such as swidden. When swidden land is converted to cash cropping, access to land becomes contested. State structures, in formalizing smallholder plots, create a hierarchy that favors men, and individuals with greater access to information and more knowledgeable regarding the inheritance structures have power in land conversion and land use. They tend to be the first in claiming individual rights to communal swidden land by converting to cash crops or trees. In the process, this often left women with less access and rights.

Has the development of rubber and oil palm crops affected the gendered gap in labour? The redeployment of labour from swidden agriculture to engage with oil palm does not seem to affect men negatively, as most of their labour contributions have been substituted by agricultural inputs and technology. Such changes, however, widened the gendered access to labour for swidden. Despite the use of agricultural inputs, women's labour in swidden remains unchanged, and has even increased due to the environmental consequences of shortened fallows. This has constrained their engagement in wage labour for oil palm as casual workers, which does not provide adequate compensation and benefits. In the case of rubber, because of the nature of its production nature and proximity to longhouse, women have the freedom to manage and balance their time to both rubber and swidden production, but this has also increased the amount of work that women bear.

Has the interaction with oil palm and rubber affected gendered gap to social capital? Traditionally, men through *bejalai* have had wider access to more diverse social networks in comparison to women whose networks were often limited to the longhouse. For women in a remote longhouse, improved road access facilitated connections to itinerant traders. In spite of this, the gendered gap to social capital has not necessarily diminished. Our finding showed how reliance on itinerant traders and asymmetric information on price and has in fact lowered women's bargaining power. The finding also showed the widening gap of access to traditional labor network exchanges of *beduruk*, and its inherent social network, as the system is disrupted by men's labour redeployment for oil palm.

8.2. Lessons for REDD +

At the time of our research, REDD + was still only in the readiness stage at the district level. However, all communities had experiences with forest conservation programs, which is one component of a REDD + program. In this section, we transfer our analyses of the gendered

gaps from commercial crop development to provide some lessons for the emerging REDD + initiatives. Ongoing research of REDD + objectives and policies throughout Southeast Asia show how REDD + could be implemented in several ways:

1. Most commonly, implementation of REDD + programs aim to strengthen protected areas and conservation objectives, which also normally includes stopping swidden practices (Dwyer and Ingalls, 2015; Dressler, 2013);
2. REDD + could be directed towards sustaining long rotational swidden and fallows in a mosaic landscape that can support carbon, biodiversity and local livelihood outcomes (Fox et al., 2009; Hett et al., 2012; Dressler et al., 2017). This would be an ideal scenario in the region but seems unlikely given the marginalization of swidden in state policies; and
3. REDD + could strengthen land and forest governance by tackling oil palm as the main driver of deforestation (Thaler and Anandi, 2017).

In all the possible modes of REDD + implementation, the gendered gaps in access to land and labour, opportunities for wage work, and information and knowledge can be easily reinforced (or transformed) depending on how formalized procedures and relationships established through REDD + interact with existing local social structures (Westholm and Arora-Jonsson, 2015; Haug, 2017). If REDD + benefits are distributed based on rights to forest and fallow area, land will increasingly be contested. The potential removal of communal swidden and fallow land to registered individual land plots similar to the state-led oil palm schemes would lead to similar impacts of eroded rights of women and their possible exclusion from participating and accessing REDD + benefits. If REDD + benefits are equally distributed to all households within a conservation forest, REDD + benefits might no longer commensurate with the differential costs that are incurred by different groups in a community in giving up swidden as some groups are will have better access to networks for alternative wage labor and migration opportunities.

In addition, an implementation of REDD + that reduces access to land for swidden may diminish women's role in fulfilling household food security and the freedom they have in managing swidden. REDD + might create new opportunities for engagement in technical activities related to forest monitoring and carbon measuring, careful design of these jobs as long-term (if not full-time) assignments with benefits would provide potential for transformative gender equality.

REDD + as a mechanism to tackle oil palm and other industrial drivers of deforestation may provide the most effective outcome in terms of reduced emissions, but appear unlikely given the prevalent discourse of deforestation, commercialization and plantation expansion as a necessary process of development (Thaler and Anandi, 2017; Dressler, 2013). Studies throughout Southeast Asia have shown that controlling swidden has become a focus for development, poverty reduction and forest governance within a network of NGO, government and company actors. The limitation of swidden also plays an instrumental role in clearing space for industrial land uses (logging and oil palm concessions) and promoting the deeper integration of villagers into the market economy (Thaler and Anandi, 2017; Dwyer and Ingalls, 2015; Dressler, 2013; Lestrelin et al., 2012). This inability of REDD + to address drivers of deforestation inherent in these markets and development models will further widen the gendered gaps that we illustrated in this paper from the swidden community's experience with oil palm plantations.

Even though REDD + processes involve safeguards to ensure social and gender equity, these have been narrowly implemented and largely relegated as checklist exercises without a clear strategy for addressing gendered power relations (Westholm and Arora-Jonsson, 2018; Bee and Sijapati Basnett, 2017). Consequently, REDD + can be easily turned into a top-down approach that supports existing socially constructed gender relations, where men typically represent the household.

Information is not always shared with wives, and women's access gap to social capital (in the form of a network of information sharing) could be widened. To ensure equal access to REDD+ information, it is important to explore the different social foci where information is traditionally shared and to create opportunities and safe spaces for dissent and resistance.

9. Conclusions

This study has shown how a development trajectory towards a more market/cash based economy impacts differently on men and women (also found in Morgan, 2017; Park and White, 2017; Haug, 2017; Silvey and Elmhirst, 2003; Vanwey, 2004). While development of oil palm plantations and engagement with rubber markets is perceived as increasing livelihood opportunities through income-earning activities, swidden remains an important aspect of local livelihood and cultural identity. Local communities are therefore struggling to find a balance between the security of swidden with other market-based livelihood activities. In these already busy spaces, REDD+, aiming at emissions reductions from avoided deforestation and initially thought of as another market-based mechanism though increasingly 'development aidified', is being introduced (Brockhaus et al., 2012; Angelsen, 2017). Our observations from Kalimantan, perhaps not surprisingly, echo other literature that calls for context-specific, local understandings before introducing 'development'. Gendered co-benefits, from such interventions, can be outbalanced by gendered burdens, thereby gender-sensitive safeguards to avoid harm and unintended, disempowering consequences will be important (Westholm and Arora-Jonsson, 2018).

Our analysis of gender asset gaps combined with an intersectionality lens has highlighted how market interventions have produced major changes along the intersections of gender, age and class, and created new opportunities for some, but also new risks for others. In particular class and the prestige attributed to class, is not static but changes are accelerated with the emergence of new types of labour and new social hierarchies. When looking at the assets of land, labour, and social capital, we found that changing power relations within these assets were expressed mainly through new asymmetries in diverse types of knowledge, ranging from inheritance rights to market information and to job opportunities enabled through access to higher education. Mobility was another site of changing power relations, especially concerning the intersections of gender and age. While our analysis remains limited in its scope, however, it highlights the importance of understanding the many dimensions – and intersections – of how power relations play out and what enables people to seize new opportunities for their livelihoods and aspirations. More importantly, an intersectionality lens brings to the forefront how these diverse interventions actually may hinder people to realize their sustainable livelihood goals.

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